

AMENDMENTS TO THE CLAIMS

Claims 1-52. (Canceled)

53. (New) A component mounting apparatus comprising:

a component feed unit for executing a component feed operation for feeding components in order to allow the components to be picked up;

a head unit, having component holding members for releasably holding the components, for executing a component holding and pickup operation for causing the components, fed by said component feed unit, to be held and picked up by at least one of said component holding members for mounting of the components onto a board;

a head unit control section for controlling the component holding and pickup operation to be executed by said head unit;

a component feed unit control section for controlling the component feed operation to be executed by said component feed unit; and

a main control section for transmitting to said head unit control section a recipe of an operational program for causing said head unit to execute the component holding and pickup operation, and for transmitting to said component feed unit control section a recipe of an operational program for causing said component feed unit to execute the component feed operation, with said head unit control section being operable to control said head unit to execute the component holding and pickup operation based on the recipe transmitted by said main control section to said head unit control section, and with said component feed unit control section being operable to control said component feed unit to execute the component feed operation based on the recipe transmitted by said main control section to said component feed unit control section,

wherein said head unit control section is operable to transmit a timing signal, based on execution of the component holding and pickup operation, to said component feed unit control section, and said component feed unit control section is operable to control said component feed unit to complete execution of the component feed operation based on the recipe transmitted by

said main control section to said component feed unit control section and the timing signal transmitted by said head unit control section to said component feed unit control section.

54. (New) The component mounting apparatus according to claim 53, further comprising:

a head moving unit for executing a head moving operation for moving said head unit in a direction roughly parallel to a surface of the board; and

a moving unit control section for controlling the head moving operation to be executed by said head moving unit,

wherein said main control section is also for transmitting to said moving unit control section a recipe for causing said head moving unit to execute the head moving operation, with said moving unit control section being operable to control said head moving unit to execute the head moving operation based on the recipe transmitted by said main control section to said moving unit control section.

55. (New) The component mounting apparatus according to claim 54, wherein said head unit control section is operable to transmit a timing signal, based on execution of the component holding and pickup operation, to said moving unit control section, and said moving unit control section is operable to control said head moving unit to complete execution of the head moving operation based on the recipe transmitted by said main control section to said moving unit control section and the timing signal transmitted by said head unit control section to said moving unit control section.

56. (New) The component mounting apparatus according to claim 55, wherein said moving unit control section is operable to transmit a timing signal, based on execution of the head moving operation, to said head unit control section, and said head unit control section is operable to control said head unit to complete execution of the component holding and pickup operation based on the recipe transmitted by said main control section to said

head unit control section and the timing signal transmitted by said moving unit control section to said head unit control section.

57. (New) The component mounting apparatus as defined in claim 55, wherein said head unit control section is also operable to transmit timing signals that are formed based on positions of said component holding members along a direction roughly perpendicular to the surface of the board.

58. (New) The component mounting apparatus according to claim 54, wherein said head unit is also operable to execute a component mounting operation for mounting a component or components, held by said at least one of said component holding members, onto the board by causing the component or components to be released from said at least one of said component holding members, and

said main control section is also for transmitting to said head unit control section another recipe for causing said head unit to execute the component mounting operation, and is also for transmitting to said moving unit control section a further recipe for causing said head moving unit to execute a head moving operation associated with the component mounting operation,

with said head unit control section being operable to control said head unit to execute the component mounting operation based on the another recipe transmitted by said main control section to said head unit control section, and with said moving unit control section is operable to control said head moving unit to execute the head moving operation associated with the component mounting operation based on the further recipe transmitted by said main control section to said moving unit control section.

59. (New) The component mounting apparatus according to claim 58, wherein said head unit control section is also operable to transmit a timing signal, based on execution of the mounting operation, to said moving unit control section, and said moving unit control section is operable to control said head moving unit to complete execution of the head

moving operation associated with the component mounting operation based on the further recipe transmitted by said main control section to said moving unit control section and the timing signal transmitted by said head unit control section to said moving unit control section.

60. (New) The component mounting apparatus according to claim 58, wherein said main control section is for transmitting to said head unit control section the further recipe for causing said head unit to execute the component mounting operation by transmitting to said head unit control section a recipe including information capable of recognizing said at least one of said component holding members to be used in execution of the component holding and pickup operation or in execution of the component mounting operation.

61. (New) The component mounting apparatus according to claim 54, wherein said main control section comprises

- (i) a recipe forming section for forming each recipe, and
- (ii) a recipe transmission section for transmitting each formed recipe.

62. (New) The component mounting apparatus according to claim 61, wherein at least one of said head unit control section, said component feed unit control section, and said moving unit control section, is operable to transmit to said main control section error information generated when operations are executed by a corresponding at least one of said head unit, said component feed unit, and said head moving unit, based on a corresponding recipe, said recipe forming section is operable to correct a recipe relevant to the error information, from among already transmitted recipes, based on the error information transmitted to said main control section , and

said recipe transmission section is operable to transmit the corrected recipe so as to allow an already transmitted recipe to be replaced by the corrected recipe.

63. (New) The component mounting apparatus according to claim 54, wherein said main control section is for transmitting to said moving unit control section the recipe for causing said head moving unit to execute the head moving operation by transmitting to said moving unit control section a recipe including positional information corresponding to a movement position of said at least one of said component holding members, in a direction roughly along the surface of the board, at which the component holding and pickup operation is to be executed or a component mounting operation is to be executed.

64. (New) The component mounting apparatus according to claim 54, wherein said moving unit control section is provided for said head moving unit.

65. (New) The component mounting apparatus according to claim 53, wherein said main control section is for transmitting to said head unit control section the recipe for causing said head unit to execute the component holding and pickup operation by transmitting to said head unit control section a recipe including

(i) an operational program for executing a component holding preparational operation for causing said at least one of said component holding members to be moved down to a component holding standby height position along a direction roughly perpendicular to a surface of the board; and

(ii) an operational program for executing a component holding main operation for causing said at least one of said component holding members to be further moved down from the component holding standby height position and hold a component or components so as to allow the component or components to be picked up by said at least one of said component holding members, and

said head unit control section is operable to cause said component feed unit control section to recognize completion of execution of the component holding preparational operation by transmission of the timing signal from said head unit control section to said component feed unit control section.

66. (New) The component mounting apparatus according to claim 53, wherein said component feed unit comprises component pickup positions linearly arranged with a first constant pitch, and is to arrange the components so as to allow the components to be picked up by said component holding members,

said component holding members are arranged with a second constant pitch, that is an integral multiple of the first constant pitch, along a direction in which said component pickup positions are linearly arranged, and

said main control section is for transmitting to said component feed unit control section the recipe for causing said component feed unit to execute the component feed operation by transmitting to said component feed unit control section a recipe including positional information of at least one of said component pickup positions where the component feed operation is to be executed.

67. (New) The component mounting apparatus according to claim 66, wherein said main control section is for transmitting to said head unit control section the recipe for causing said head unit to execute the component holding and pickup operation by transmitting to said head unit control section a recipe including

(i) information capable of recognizing said at least one of said component holding members to be used in execution of the component holding and pickup operation, and

(ii) positional information of the at least one of the component pickup positions where the component feed operation is to be executed.

68. (New) The component mounting apparatus according to claim 53, wherein said head unit control section is provided for said head unit, and said component feed unit control section is provided for said component feed unit.

69. (New) The component mounting apparatus according to claim 53, wherein said component feed unit control section is operable to transmit a timing signal, based on execution of the component feed operation, to said head unit control section, and said head unit control section is operable to control said head unit to complete execution of the component holding and pickup operation based on the recipe transmitted by said main control section to said head unit control section and the timing signal transmitted by said component feed unit control section to said head unit control section.

70. (New) The component mounting apparatus according to claim 69, wherein said component feed unit comprises component pickup positions in which the components are to be arranged so as to allow the components to be picked up by said at least one of said component holding members,

said main control section is for transmitting to said component feed unit control section the recipe for causing said component feed unit to execute the component feed operation by transmitting to said component feed unit a recipe including

(i) an operational program for executing a component feed preparational operation for transporting the components in said component feed unit so that the components become positioned in the component pickup positions; and

(ii) an operational program for executing a component feed main operation for putting the components, positioned in the component pickup positions, into a state in which the components can be picked up by said at least one of said component holding members, and

said component feed unit control section is operable to control said component feed unit to execute the component feed preparational operation based on transmission of the recipe from said main control section to said component feed unit control section, operable to control said component feed unit to complete execution of the component feed main operation based on transmission of the recipe from said main control section to said component feed unit control section and transmission of the timing signal from said head unit control section to said component feed unit control section, and operable to cause said head unit control section to

recognize completion of execution of the component feed main operation by transmission of the timing signal from said component feed unit control section to said head unit control section.

71. (New) The component mounting apparatus according to claim 53, wherein said head unit control section is also operable to transmit timing signals that are formed based on positions of said component holding members along a direction roughly perpendicular to the surface of the board.

72. (New) A component mounting method comprising:
receiving a recipe, of an operational program, for execution of a component holding and pickup operation to be performed by a head unit having component holding members for releasably holding components, and executing said component holding and pickup operation based on the received recipe, whereby at least one component fed by a component feed unit is held and picked up by at least one of said component holding members;

transmitting from said head unit to said component feed unit a timing signal based on execution of said component holding and pickup operation; and

receiving a recipe, of an operational program, for execution of a component feed operation to be performed by said component feed unit, and completing said component feed operation based on this received recipe and said timing signal transmitted from said head unit to said component feed unit, whereby components are fed by said component feed unit so as to be allowed to be held and picked up by said component holding members for mounting onto a board.

73. (New) The component mounting method according to claim 72, further comprising:

receiving in a head moving unit a recipe for execution of a head moving operation, and based on this received recipe, using said head moving unit to execute said head moving

operation, whereby said head unit is moved roughly parallel to a surface of the board to a position above the board;

receiving in said head unit a recipe for execution of a component mounting operation, and based on this received recipe, using said head unit to execute said component mounting operation, whereby said at least one component that is held by said at least one of said component holding members is mounted onto the board; and

transmitting from said head unit to said head moving unit a timing signal based on execution of said component mounting operation,

wherein execution of said head moving operation is completed based on the recipe received in said head moving unit and said timing signal transmitted from said head unit to said head moving unit.

74. (New) The component mounting method according to claim 73, wherein said recipe for execution of said component mounting operation, and said recipe for execution of said head moving operation, are formed on a main body side of a component mounting apparatus provided with said head unit and said component feed unit,

such that receiving said recipe for execution of said component mounting operation comprises transmitting this recipe from the main body side of the component mounting apparatus to said head unit, and receiving said recipe for execution of said head moving operation comprises transmitting this recipe from the main body side of the component mounting apparatus to said head moving unit.

75. (New) The component mounting method according to claim 73, further comprising:

transmitting to said head unit from said head moving unit, during execution of said head moving operation, a timing signal based on the execution of said head moving operation,

wherein using said head unit to execute said component mounting operation comprises using said head unit to execute said component mounting operation based on said timing signal transmitted from said head moving unit to said head unit.

76. (New) The component mounting method according to claim 72, wherein said recipe for execution of said component holding and pickup operation, and said recipe for execution of said component feed operation, are formed on a main body side of a component mounting apparatus provided with said head unit and said component feed unit,

such that receiving said recipe for execution of said component holding and pickup operation comprises transmitting this recipe from the main body side of the component mounting apparatus to said head unit, and receiving said recipe for execution of said component feed operation comprises transmitting this recipe from the main body side of the component mounting apparatus to said component feed unit.

77. (New) The component mounting method according to claim 72, further comprising:

transmitting to said head unit from said component feed unit, during execution of said component feed operation, a timing signal based on the execution of said component feed operation,

wherein using said head unit to execute said component holding and pickup operation comprises using said head unit to execute said component holding and pickup operation based on said timing signal transmitted from said component feed unit to said head unit.